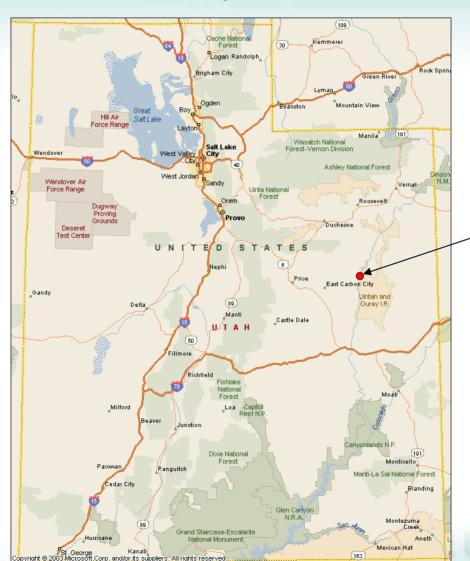
# Methods for Generation of a Fish Consumption Advisory

D. Jason Scholl, Ph.D.
Environmental Epidemiology
Utah Department of Health



## **Desolation Canyon, Green River**



**Desolation Canyon** 

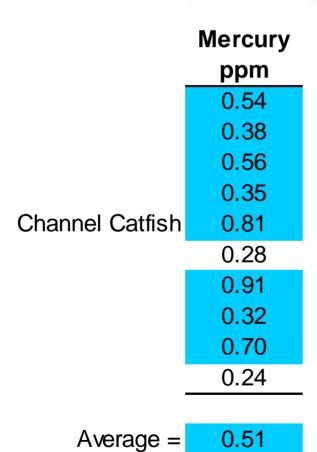


## Desolation Canyon, 2002 Results, Individual Fillets

	Mercury	<b>Average</b>
Species	ppm	ppm
Channel catfish	0.307	
Channel catfish	0.128	0.225
Channel catfish	0.291	
Smallmouth bass	0.143	
Smallmouth bass	0.148	0.139
Smallmouth bass	0.127	
Common carp	0.114	
Common carp	0.111	0.111
Common carp	0.110	
Red shiner	0.092	-



#### Desolation Canyon, 2005 Results, Individual Fillets



8 of 10 catfish above screening value of 0.3 ppm



#### **Fish Advisory Recommendations**

• Based on the mercury levels found in channel catfish from Desolation Canyon (Green River), UDOH recommends a fish consumption advisory as follows:

Adults: no more than 2 eight-oz meals/month Children and pregnant women: no more than 1 four-oz meal/month of channel catfish from Desolation Canyon



#### **Data Review Process**

- Screening Value (SV)
  - -value which warrants further investigation
- Consumption Rate calculations
  - -maximum allowable fish consumption (kg/day)
- Consumption Limits
  - maximum allowable fish consumption (meals/month)



### **Screening Value**

$$SV = [(MRL)(BW)]/CR$$

SV = Screening Value for mercury (mg/kg or ppm)

MRL = Minimal risk level (Hg = 0.0001 mg/kg/day)

BW = Body weight (70 kg)

CR = Mean daily consumption (0.025 kg/day)

EPA standard SV for mercury is 0.3 mg/kg (ppm)



### **Consumption Rate**

$$CR_{lim} = [(MRL)(BW)]/C_{m}$$

Department

of Health

CR<sub>lim</sub> = Maximum allowable fish consumption (kg/day)

MRL = Minimal risk level (Hg = 0.0001 mg/kg/day)

BW = Body weight (70 kg for adults, 16 kg for children)

 $C_m$  = Measured concentration of mercury in fish (mg/kg)

Based on the measured concentration and body weight, the  $CR_{lim}$  is the maximum consumption rate allowable without human health effects.

#### **Consumption Limits**

$$CR_{mm} = [(CR_{lim})(T_{ap})]/MS$$

CR<sub>mm</sub> = Maximum allowable fish consumption (meals/month)

CR<sub>lim</sub> = Calculated (kg/day)

 $T_{ap}$  = Time averaging period (30.44 days/month)

 $\overrightarrow{MS}$  = Meal size (0.227 kg fish/meal for adults, 0.113 for children)

Based on the consumption rate limit and meal size, the CR<sub>mm</sub> is the maximum allowable meals per month without human health effects.



#### **Advisory Process**

- Agencies collect samples, have them analyzed for mercury
- UDOH analyzes data, generates health consultation report, generates fish consumption recommendations if necessary
- Internal review of report and analysis
- Joint press release

Department

of Health

• UDOH produces and distributes fish advisory signs and fact sheets on mercury for species and location

# **Assessment of Mercury in Human Hair Study**

"An Investigation of Factors Related to Levels of Mercury in Human Hair" Environmental Quality Institute



## Utah Data All Participants

	# Participant	# above 1.0 ppm	% above 1.0 ppm	Average Hg in hair
National	6571	1529	23%	-
Utah	139	21	15%	0.67 ppm
SLC	121	15	12%	0.59 ppm



## Utah Data Women of Childbearing Age (16-49)

	# Participant	# above 1.0 ppm	% above 1.0 ppm	Average Hg in hair
National	2828	640	23%	-
Utah	41	4	10%	0.56 ppm
SLC	35	2	6%	0.39 ppm



### Why 1.0 ppm in Hair?

- The EPA's RfD for methylmercury is 0.0001 ppm/day. The RfD is a dose within a range of exposures judged to be without known adverse effects.
- RfD is associated with a hair Hg concentration of 1.1 ppm.
- The RfD has a "safety" factor of 10X, based on a benchmark dose of 11 ppm Hg in hair.
- 11 ppm Hg in hair is equivalent to a "NOAEL" of neurodevelopmental changes.

Department

of Health

#### **Unknowns About Hair Mercury**

- Hair mercury levels do not reveal source.
  - ➤ Local vs. Commercial fish.
  - Food vs. Occupational vs. Other environmental
- Hair mercury levels are from *past* exposure.



## **Fish Mercury Levels**

Utah Advisories				
	Species	Hg Level		
Mill Creek	Brown Trout	0.33 ppm		
Gunlock	Largemouth Bass	0.47 ppm		
Desolation Canyon	Channel Catfish	0.51 ppm		
	FDA/EPA Advisories			
	Species			
	King Mackerel	0.73 ppm		
	Shark	0.988 ppm		
	Swordfish	0.976 ppm		
	Tilefish	1.45 ppm		



#### FDA/EPA Recommendations

For women and children to receive the benefits of eating fish and shellfish, they should follow these 3 recommendations:

- 1. Do not eat Shark, Swordfish, King Mackerel, or Tilefish.
- 2. Eat up to 12 oz/week of a variety of low mercury fish such as: shrimp, canned light tuna, salmon, pollock, and catfish.
- 3. Check local advisories for fish from local lakes, rivers and coastal areas.

